Appendix G
Pentel of America Limited
Torrance, California Factory
Pilot Study Report

California Environmental Protection Agency
Environmental Management System Project

1.0 Pilot Description

Pentel of America, Ltd. is headquartered in Torrance, California. While there are offices in several states and a separate blister packaging facility in Torrance, all U.S. manufacturing is carried out at the Torrance Factory. Operations include precision metal machining, plastic injection molding, water-based ink production, and writing instrument assembly and packaging. There are approximately 200 employees at the highly automated Torrance Factory.

As a leading international manufacturer of writing instruments, stationary goods, and art supplies, Pentel Company, Ltd. has facilities located worldwide. Headquartered in Tokyo, Japan, the company employs a total international workforce of 2,100 employees. Products manufactured include automatic (mechanical) pencils, non-refillable roller ball pens, refillable ballpoint pens, gel ink pens, ink, lead, erasers, correction fluid, highlighters, markers, crayons, water and oil paints, pastels, glue, and artist brushes. Pentel invented roller ball technology and pioneered graphite lead. In addition, Pentel is the only writing instrument company to receive the Deming Award for recognition of the highest standard of quality.

The pilot project is classified as a recently-implemented EMS for purposes of addressing the research questions. Pentel began EMS development in October 1999, implemented the first cycle of its EMS April through June 2001, and was certified to the ISO 14001 Standard at the end of August 2001. Pentel contributes the perspective and experience of working with a medium-sized manufacturing facility, which has integrated, to the degree possible, an ISO 14001 EMS with the previously existing ISO 9001 registered quality system.

<u>Pilot Project Management</u>

The Pentel of America factory in Torrance was selected as a Cal/EPA pilot project in June 2000, after completion of two public hearings and a 30-day comment period. The Pilot Project Manager for Cal/EPA is Renée Lawver, a Senior Scientist at the California Integrated Waste Management Board. The primary Pentel representative is Tom Armenoff, originally the Management Representative in charge of the quality and environmental management systems for Pentel and later their consultant as an employee of EnviroSolve Corporation. Vern Lindquist is the current Management

Representative for Pentel who oversees the management systems. Hideaki Tani is the Environmental Coordinator. The EMS was implemented under the leadership of Hideyuki Sugimatsu, Vice President of Manufacturing.

History of Environmental Management at Pentel of America

Pentel manufacturing facilities in Ibaraqi and Yoshikawa, Japan have successfully completed ISO 14001 registration, while the factory at Soka, Japan is nearing implementation of its EMS. These efforts together reflect the Japan headquarters' long-held policy to preserve and improve the environment, and its support of ISO 14001, the voluntary international standard for environmental management systems, is one of the tools for accomplishing this objective. Mr. Sugimatsu, Vice President of Manufacturing at Pentel, described his motivation for pursuing EMS development and certification as a way to bring renewed focus and critical review of Pentel's operations to continue to make improvements. The objective to certify to the ISO 14001 Standard was articulated in July 1999, soon after the Torrance factory obtained its ISO 9001 registration in June 1999.

Although a formally identified EMS is a new addition, environmental concerns have traditionally influenced management decision-making and planning. In early 1999, the company made a significant investment in the installation of a state-of-the-art, self-contained and completely enclosed, carbon dioxide degreasing system to reduce solvent use and thereby minimize air quality impacts. When EMS design began, it was expected by Pentel management that the systematic approach of an EMS would result in further environmental benefits in the areas of reduced waste generation, increased recycling of plastics and other materials, more efficient hazardous waste handling and additional improvements in air quality, particularly in oil and particulate emissions.

Pentel was unaware of some of its regulatory requirements prior to EMS design and the factory is not considered a major concern by its regulatory agencies. Pentel had not been documented in agency files as having compliance problems and was not subject to rigorous regulatory agency oversight, prior to screening for selection for participation in the pilot project.

No factory-wide, voluntary environmental programs were in place at Pentel prior to developing its EMS. Pentel did receive recognition in 1999 from the California Integrated Waste Management Board's Waste Reduction Award Program.

2.0 Project Objectives

The pilot project with Pentel was conducted in order to meet the following objectives specified in AB 1102 (Stats. 1999, Ch. 65) codified in Public Resources Code, Section 71045 et seq.

Objective 1 Whether and how the use of an environmental management system (EMS) by a regulated entity increases public health

and environmental protection over their current regulatory requirements[1]; and

Objective 2 Whether and how the use of an EMS provides the public greater information on the nature and extent of public health and environmental effects than information provided by their current regulatory requirements[2].

To the above, the Cal/EPA added the following objectives:

Objective 3 Evaluate economic indicators to determine incentives and barriers to EMS implementation

Objective 4 Identify challenges and successful examples of EMS implementation

Further, each pilot participant had one or more additional pilot specific objectives. The following pilot-specific objective pertains to the Pentel project.

Objective 5 Record observations of whether and how Pentel's existing quality management system supports their EMS implementation efforts.

In the following sections, each objective will be paraphrased. For example, Objective 1 is referred to as simply environmental protection. The term environmental protection is intended to capture protection of both environmental and public health.

3.0 Project Methodology

Over the study period, Tom Armenoff, representing Pentel, provided information about the pilot project's EMS through completion of the University of North Carolina National EMS Data Protocols and the California Protocol. Renée Lawver, the Cal/EPA pilot project manager, reviewed the completed protocols and, where protocol data were insufficient to answer the research questions, interviewed Tom Armenoff to gain a better understanding of the subtleties of EMS implementation and performance improvements.

[1] Protection provided by current regulatory requirements is defined as those protections provided through the issuance, enforcement, and monitoring of any permit, requirement, authorization, standard, certification, or other approval issued by a federal, state, regional or local agency to the regulated entity for the protection of the public heath or the environment (PRC § 71046(a)(1)).

[2] Information provided by current regulatory requirements is defined as that information provided through the issuance, enforcement, and monitoring of any permit, requirement, authorization, standard, certification, or other approval issued by a federal, state, regional or local agency to the regulated entity for the protection of the public heath or the environment, or any other law or regulation governing the disclosure of public information (PRC § 71046(a)(2)).

In addition, Pentel hosted a Southern California EMS Working Group meeting on May 17, 2001, at which they explained their processes, material flows, EMS, and provided a tour of the Torrance factory. Mr. Sugimatsu, Vice President of Manufacturing, participated in the forum. Tom Armenoff, Vern Lindquist, and Hideaki Tani participated in the final Statewide EMS Working Group workshop on October 17, 2001. Mr. Armenoff provided his perspective on Pentel's EMS implementation experience in a panel discussion. The exchange of questions and answers provided some additional information for this case study.

Objective 1 Environmental Protection

To determine whether and how improved environmental protection resulted from EMS implementation, the following three primary categories of information were evaluated.

1. Awareness and commitment
2. Systematic management of environmental impacts
3. Environmental performance indicators

Awareness and commitment refers to the scope of environmental issues the organization manages. Staff reviewed and analyzed the following measures of awareness and commitment.

1. The presence of an environmental policy which describes the organization's commitments and principles in regards to environmental protection
2. Demonstrated knowledge and understanding of environmental laws, regulations, and other requirements
3. Demonstrated knowledge and understanding of the environmental impacts of the organization
4. Documentation of objectives and targets for environmental protection improvements

Systematic management of environmental impacts refers to the ability of an organization to better protect the environment through a more mature and effective system of environmental management.

Staff reviewed and analyzed the following measures of systematic management for environmental protection.

1. Documented implementation strategies and responsibilities designed to meet regulatory requirements, manage significant aspects, and achieve objectives and targets for improved environmental protection
2. Measures to assess environmental performance
3. Audit and review processes to assess the performance of the management system and make system adjustments in order to continually improve environmental performance and protection

Environmental performance indicators are the most quantitative and direct way of measuring changes in environmental protection. Examples include energy use, water use, solid and hazardous waste reduction, air emission, and quality of water discharge.

Project staff reviewed and analyzed environmental data in the following areas to determine whether the EMS improved environmental protection.

1. Progress towards objectives and targets
2. Pre and Post EMS Environmental Performance
3. Performance Beyond Regulatory Requirements
4. Compliance Performance

Objective 2 Environmental Information

Staff analyzed the following two factors to determine whether and how an EMS provides greater environmental information to the public was accomplished.

1. The level of public and stakeholder involvement in EMS development, implementation, and review; and
2. The level of improvements in the accessibility and quality of environmental information available to the public as a result of EMS implementation.

This information was collected through the National Database, California Protocol and through the Cal/EPA Project Manager's observations.

Objective 3 Economic Indicators

Economic data was not provided by the pilot project. Therefore, this analysis is not included in the case study report.

Objective 4 Successes and Challenges with EMS Implementation

In order to capture and describe additional lessons learned from Pentel's EMS experience, challenges and successes were identified through the Cal/EPA Project Manager's observations, interviews with the primary Pentel contact, and data analysis. Understanding these challenges and successes helps to illuminate the role EMSs can play in improving environmental protection.

Objective 5 Evaluate the Role of Existing Quality Management System in Supporting EMS Implementation

In addition to the general objectives of the pilot project, the Cal/EPA Pilot Project Manager made observations which provide some insight into the development and continual improvement of an EMS integrated with a previously existing quality management system.

4.0 Discussion and Analysis

Objective 1 Environmental Protection

Awareness and Commitment

<u>Environmental Policy</u>

Pentel's Environmental Policy meets the requirements of the ISO 14001 standard, which requires top management commitment to continually improve the EMS, prevent pollution, and comply with environmental legal requirements. The policy addresses

responsibility through assigning responsibility to every employee. Management commitment is indicated by the signature of the Vice President of Manufacturing.

The Environmental Policy of the Pentel factory in Torrance states that “every employee is responsible for the environment, following all environmental laws, regulations, and any Company requirements created to strengthen existing laws and regulations in protecting people and the environment.“

Specific commitments include:

- Preventing pollution;
- Reducing waste and decreasing electricity, gas, and water usage;
- Recycling and reusing material;
- Assuring that supplies, materials, and products are environmentally friendly; and
- Preparing for the possibility of an environmental emergency.

In addition, the policy states that:

- It is communicated to all employees;
- A copy is made available to anyone upon request;
- Scheduled audits, training, and other activities are carried out to assure that the policy is understood and followed; and
- It is kept up to date with changing conditions and information through periodic management reviews.

The ISO 14001 Standard requires that the policy be “appropriate to the nature, scale, and environmental impacts of the organization's activities, products or services.” The scope of the impacts is outlined in the Environmental Policy. The scope of the EMS, or fence-line, is defined as the significant aspects and impacts that Pentel can control and over which it can be expected to have an influence. In other words, the EMS fence-line or scope describes the organization’s acceptance of boundaries of environmental responsibility managed via the EMS.

Prior to the EMS, no written commitment from top management was communicated regularly to employees, which specified responsibility for environmental impacts and commitment to environmental protection. This articulation of top management commitment would be expected to have some improvement on standard of care practiced by the organization. The following sections describe implementation of the policy and contain the evidence and analysis of whether improvement was achieved.

Knowledge and Understanding of Legal Requirements

The ISO 14001 Standard requirement is as follows: “The organization shall establish and maintain a procedure to identify and have access to legal and other requirements to which the organization subscribes that are applicable to the environmental aspects of its activities, products, or services.” Based on conversations with the Pentel Management

Representative and the initial gap assessment performed by the Pentel Management Representative and Environmental Coordinator, a formal procedure did not exist prior to the EMS.

To create a regulatory checklist and procedure for updating knowledge about legal requirements in fulfillment of ISO 14001 requirements, Pentel invited environmental regulatory personnel into the factory to inspect the facility and operations. As a result of this process, Pentel became aware of the South Coast Air Quality Management District Solvent Rule, the State Water Resources Control Board stormwater management requirements, and additional hazardous waste disposal and source reduction planning requirements of the Department of Toxic Substances Control. Upon becoming aware of these requirements, Pentel made the changes needed to comply and implemented a regulations compliance database.

Knowledge and Understanding of Environmental Impacts

Significant aspects are a good indicator of awareness and commitment. An environmental aspect is an element of an organization's activities, products, or services that can interact with the environment. Significant aspects and impacts are determined by the organization based on a self-established methodology. Management of all significant aspects is required by ISO 14001.

Pentel Department managers evaluated process and material flows throughout the factory. For each department, they identified aspects and impacts arising from their activities. Significance was determined based on the following criteria and associated rating scales.

Criteria	Scale	
	0	10
(1) Does the factory have any control over this impact?	no control	complete control
(2) How much of the environment does this impact affect?	hardly anything affected	affects the whole planet
(3) How serious is this impact?	not serious at all	causes death & destruction
(4) How likely is it that this impact will occur?	may never occur	is already happening
(5) How long will this impact affect the environment?	ends immediately	goes on forever
(6) At this time, is this impact causing a noncompliance with any law or regulation?	no	yes
(7) How hard would it be to improve the affects of this impact?	no effort at all	nearly impossible
(8) How much cost would it cost to improve the affects of this impact?	no cost	millions of dollars
(9) How much does this impact affect public opinion of Pentel?	no affect	is talked about by everyone

Summarized from Analysis of Aspects and Impacts Significance Ratings, a memo from T.C. Armenoff to Vern Lindquist dated 12/11/00.

Pentel identified twenty-one significant aspects associated with its operations, as shown in Table 1. Regulated impacts include air, water, hazardous material and waste. Employee health and safety is outside the scope of Pentel's current EMS. Nonregulated impacts of Pentel's activities include air, water, solid waste, energy, and material or resource inputs.

Most of the impacts deemed significant are unregulated impacts. The most frequently identified impact is in the non-regulated area of solid waste generation, then energy use and air quality. The most frequently identified regulated impact is hazardous materials use and waste.

The exercise of identifying significant environmental aspects and impacts requires priority-setting at the Factory level and is a prerequisite to integrating environmental improvement initiatives with budget planning cycles and planning for manufacturing process changes. This exercise helped identify opportunities for proactive management that reliance on regulatory inspections would not be expected to uncover or necessarily communicate to top management. As a result of the EMS, a Factory-wide management approach with accountability of each Department to reducing environmental impacts was put in place.

Table 1 Significant Aspects and Impacts

Aspect	Regulated Impacts				Non-Regulated Impacts					
	Air	Water	Haz. Material or Waste	Health & Safety	Air	Water	Solid Waste	Energy	Material/ Resource Input	Other
Disposal of oily mop water			X		X			X		
Disposal of scrap plastic/product							X			
Electricity use					X			X		
Use and disposal of solvent	X									
Disposal of packaging							X			
Disposal of product samples and defective products							X			
Disposal of ink samples			X			X	X			
Disposal of spent wastewater treatment filters			X				X			
Discharge of condensation water containing lubricating oil		X								

Table 1 Significant Aspects and Impacts, continued

Aspect	Regulated Impacts				Non-Regulated Impacts					
	Air	Water	Haz. Material or Waste	Health & Safety	Air	Water	Solid Waste	Energy	Material/ Resource Input	Other
Natural gas use					X			X		
Disposal of scrap plastic							X			
Oil discharged from machines					X					
Paper use							X	X	X	
Paper disposal							X	X	X	
Use of cutting oil									X	
Wire used to produce blanks									X	
Oil soaked absorbent					X			X		
Tip wash water			X			X		X		
Use of plastic in design							X			
Disposal of ink samples and evaluation residues			X		X					
Propane gas use					X			X		

Data sources: University of North Carolina National Database Report, EMS Design Table 2: Activities, Aspects and Impacts; and Design Update Section 4.

Objectives and Targets

Each department set objectives and targets, as listed in Table 2. Objectives include reducing both regulated and unregulated impacts arising from aspects including the following.

- Alcohol used for cleaning
- Hazardous chemicals and hazardous waste disposal
- Oily mop water
- Scrap plastic and product
- Paper use
- Electricity and natural gas use

All targets set are for impact reductions beyond those required by law and range from reductions of 1% to complete elimination. Targets are set for fiscal year ending March 30, 2002, unless otherwise noted.

Systematic Management of Environmental Protection

This section describes the actions taken by the organization that relate to the implementation and review of the EMS and explains how the organization protects the environment through its operations.

Documented Implementation Strategies and Responsibilities

The system elements put in place as part of the EMS include the following.

- Operational controls
- Emergency preparedness
- Regulatory Compliance assurance system
- Training and competency programs
- Employee involvement and communication
- Supply chain management

These system elements can be expected to improve protection of public health and safety and the environment as a complement to regulatory requirements due to the requirement of the ISO 14001 EMS Standard to demonstrate effectiveness.

Operational Controls

Operational controls are the operations and activities that are associated with managing significant aspects. ISO 14001 requires that these operations and activities be identified and planned "to ensure they are carried out under specified conditions." The organization must establish and maintain procedures related to the significant aspects of goods and services used by the organization, and communicate relevant procedures and requirements to suppliers and contractors. Work instructions, manuals, and

standard operating procedures are examples of operational controls. The effectiveness of operational controls was not evaluated as part of this pilot project.

Emergency Preparedness

Prior to the EMS, no detailed emergency preparedness plans and procedures were in place. Employees now are aware of specific actions they are to take for various possible emergencies or accidents. For example, factory doors are to be closed when an alarm sounds at the nearby Mobile Oil refinery. Employees know what actions to take in the event an ink line breaks, a drum of ink falls off a forklift, or a fire occurs on a machine. During the pre-registration audit, employees interviewed knew spill kit locations and contents as well as under what conditions to notify a manager versus take responsibility for immediately acting to control an emergency.

Regulatory Compliance Assurance System

A third-party certified EMS is required to provide objective evidence of document control and records retention, operational control, emergency preparedness and response, monitoring and measurement, and a functional corrective and preventive action system for tracking and resolving non-conformances found during internal and external EMS audits, compliance inspections by regulatory agencies, and other internal informal means. In addition, top management—individual(s) with executive responsibility for the organization and responsible for the environmental policy—review of internal and external audit findings is required. A standard operating procedure should exist to describe the management review process and those involved. Meeting records provide evidence of review and actions taken. These were not reviewed as part of this study.

Internal audits and the corrective and preventive action system created as an element of the EMS support regulatory compliance assurance. Based on information provided by Pentel for the National Protocol, the factory performs regular internal regulatory compliance audits as a result of implementing the EMS and meeting the requirement of the ISO 14001 Standard. Regulatory issues have been identified internally and resolved, in addition to the issues identified by external inspectors. The extra oversight provided by the internal compliance audits would be expected to provide a greater degree of protection for public health and the environment than primary reliance on less frequent external regulatory inspections to identify problems. In addition, internal record-keeping provides a means for management to track performance and evaluate corrective and preventive actions over time. To support its commitment to regulatory compliance, Pentel regularly updates its internal audit checklist.

Training and Competency Programs

Employees have received unprecedented training concerning job-related environmental issues. All 200 employees received two hours of training to support implementation of the EMS. As observed by Mr. Armenoff, "Employees have generally begun to exhibit an

awareness and concern for the environmental impact of their own and other's job-related activities."

Employee Involvement and Communication

The Environmental Policy is emphasized at the factory. This practice facilitates understanding and maintains employee attention on reducing environmental impacts. The following three examples illustrate changes that were initiated by employee involvement resulting from improved communication.

1. Aerosol paint cans are used in small quantities at Pentel and had not been considered "significant" during EMS development. They had been disposed in municipal waste, until an employee brought this to the attention of management. Now the empty cans are given to the metal recycler who also reconditions their 55-gallon drums and recycles their metal tip shavings.

2. Small propane bottles accumulated on-site prior to EMS implementation, without much thought given to how they should be managed. An employee raised the issue, and now they are being managed by a hazardous waste broker.

3. Prior to EMS design and implementation, the parking lot was typically full of plastic resin pellets and scrap molding runners. Since implementation, sweeping up spilled plastic is routine.

The ISO 14001 EMS Standard requires a designated Environmental Management Representative. The Management Representative for Quality Systems absorbed this responsibility. A production department manager was designated as the Environmental Coordinator to assist the Management Representative. All targeted impact reductions are set, planned, and managed by Department managers as part of their assigned responsibilities. The managers provide accountability through regular top management review. Cross-sections of employees are trained to conduct internal audits.

Supply Chain Management

The objective to eliminate heavy metals in plastic supplied to the factory is an example of supply chain management. Pentel is requiring plastic suppliers to self-certify heavy metal content.

<u>Measures to Assess Environmental Performance.</u>

The systems for measuring environmental performance are not evaluated in this case study. Instead, examples of challenges Pentel faced with metric selection are

described. Future research on the adequacy of the metrics would include addressing the following questions:

1. How are continual improvements made in measurement and what have they been?
2. Are the people responsible for measurement properly trained and is there independent verification?
3. Are measurement methods and equipment reliable, standardized, and of sufficient accuracy and precision to make conclusions about performance and opportunities for improvement?
4. Are there environmental interactions that are not being measured and tracked adequately?

Through continual improvement of the environmental management system, Pentel is refining its objectives, targets, and metrics. In some cases, it has been a challenge to initially select meaningful metrics that measure environmental impacts and may be time consuming to measure versus select metrics that are already used in production management but that may indicate an environmental impact. In other cases, what may seem to be a reduction in environmental impact based on measured performance may in fact, be a procedure change that creates a different impact that is not reported on.

For example, electricity use reduction was measured by some departments in terms of production efficiency, or pieces per hour. The higher the production efficiency, including lower scrap rates, the higher the "efficiency" of electricity use. However, this metric makes tracking electricity conservation efforts problematic. In addition, electricity metering is not on a Department basis, but on a shared basis. Based on this experience, electricity conservation was assigned to the Management Representative for Quality Systems to achieve reductions on behalf of the entire factory.

Another example of learning by doing in the area of setting metrics is the selection of the follow two objectives.

1. Reduce quantity of spent wastewater treatment filters disposed
2. Reduce quantity of wastewater treatment sludge disposed

To effect a reduction in filters and sludge, both disposed as hazardous waste, a change in rinsing procedure was put in place. The change produces less inky wastewater to be managed via the on-site wastewater treatment system, but increases the quantity of sludge disposed as hazardous waste directly from ink drums.

Through the audit and review processes, challenges in choosing environmental performance metrics can be addressed in time.

Audit and Review Processes for Continual Improvement

The audit and review processes for continual improvement are compliant with the ISO 14001 EMS Standard and are not evaluated in this case study. However, performance auditing, tracking, reporting, and management review of environmental target areas are well supported by the product quality system and the company culture. Targets are measured every month, graphed cumulatively over the fiscal year, and reviewed by the Vice President of Manufacturing on a monthly basis, with a full Management Review conducted quarterly. Managers' familiarity and acceptance of these elements of the EMS made implementation smoother than it otherwise may have been. Recently, Mr. Sugimatsu personally audited the facility's EMS and addressed his findings with department managers during management review meetings.

Environmental Performance Indicators

Environmental performance of the pilot project is described in this subsection and analyzed to evaluate whether Pentel's EMS provides improved environmental protection. Progress toward objectives and targets and measured environmental performance improvements are described for the first cycle of Pentel's EMS implementation, April through June 2001. Compliance history from 1997 through June 2001 is summarized and analyzed.

Progress towards Objectives and Targets

Of the 22 targets set, 16 targets are being met as of the end of June 2001 (see Table2). Two targeted reductions were planned for implementation later in the fiscal year and four targeted reductions were not achieved.

Emissions of volatile organic compounds have declined as particular solvents have been eliminated or dramatically reduced. Specifically, use of alcohol for general cleaning of plastics has been discontinued to comply with the South Coast Air Quality Management District's Solvent Rule. Volatile organic compound threshold exemptions expired at the end of year 2000. As Pentel can no longer use methanol to clean product, they substituted an exempt cleaner, methyl acetate, then subsequently converted to use of deionized water. While a target for 5% reduction of D-309, a solvent allowed for use in screen printing, was set, a 25% reduction was achieved.

Four of the six departments that set electricity reduction targets achieved or exceeded their target. One department set a reduction target of 1% electricity savings from lighting and achieved a 27% reduction by disconnecting unnecessary light bulbs. Another department achieved its target of 5% electricity use reduction from fluorescent lighting by installing a switch. Two departments that set production efficiency targets as indicators of electricity efficiency did not achieve their targets. Two departments that set electricity conservation targets for specified areas (3% and 5% targeted reductions) met and exceeded their targets (20% and 13% actual reductions).

According to Pentel's representative, Pentel has from time to time worked to conserve natural resources and reduce its solid waste. With EMS implementation, a factory-wide approach with consistent attention over time has improved performance significantly. With EMS implementation, reductions were achieved in paper use, plastic scrap, and wire scrap that in most cases far exceeded targets. One department did not meet its paper use reduction target, and one department did not reduce its disposal of scrap plastic/product. The cumulative scrap plastic reduction has had a positive impact on keeping stormwater runoff from the parking lot significantly cleaner.

A reduction in the amount of hazardous wastewater produced has been accomplished through changing mopping frequency and changing rinse procedure for empty ink drums.

Table 2 Objectives and Targets

Objective	Target Targets are for FY ending 3/30/02 unless noted.	Status Performance measured April-June, 2001	Regulated		Non-Regu-lated
			Meets	Beyond	
Reduction of alcohol used	Reduce by 100%	Achieved 100% reduction.		X	
Reduce usage of hazardous chemicals	Reduce D-309 usage by 5% during 2001, normalized for production	Achieved 25% average monthly reduction of D-309 solvent allowed for screenprinting.		X	
Reduce generation of oily mop water	Reduce by 10%.	Achieved 48% reduction. Changed mopping schedule in June, as planned.		X	
Reduce lubricating oil in condensate water	Reduce by 5%	Not achieved. Plan calls for reduction later in fiscal year.		X	
Reduce tip wash water usage	Reduce by 5% on normalized basis	Achieved 5% reduction.		X	
Reduce quantity of spent wastewater treatment filters disposed.	Reduce by 50%	Achieved 50% reduction. Wastewater treatment filters are disposed as hazardous waste. Change in rinsing procedure produces less inky wastewater requiring treatment, but increases quantity of sludge disposed as hazardous waste.	X		
Reduce wastewater treatment sludge.	Reduce by 30%	Achieved 59% reduction. Wastewater treatment sludge disposed as hazardous waste. Target achieved by change in rinsing procedure described above.	X		

Reduce oil leakage at machines	Reduce by 50%	Not achieved. Plan calls for reduction later in fiscal year.		X	
Reduce usage of oil-soaked absorbent.	Reduce by 5% normalized to pieces produced	Achieved 6% reduction.		X	
Reduce electrical usage.	Dept. A Reduce electrical usage for lighting by 1%	Achieved 28% average monthly reduction. Disconnected unnecessary light bulbs.			X
	Dept. B Reduce electrical usage per part by 2%	Not achieved. 18% increase in normalized electricity use. Production rate is measured and compared over time. Does not facilitate trend analysis for quantification of electricity conservation activities.			X
	Dept. C Reduce electrical usage per part by 10%	Not achieved. 4% reduction achieved. Also measures production rate not electricity conservation.			X
	Dept. D Reduce electrical usage for fluorescent lighting by 5%	Achieved 5%. Switch installed.			X
	Dept. E Reduce electrical usage in restroom and cafeteria in bldg. A by 3%	Achieved 20% average monthly reduction. Meter readings reflect electricity usage of entire side of building--more than one department's ability to control. .			X
	Dept. F Reduce electrical usage in restroom and cafeteria in bldg. B by 5%	Achieved 13% reduction.			X
Reduce natural gas usage.	Reduce by 5% each month	Achieved 14% reduction. Lowered thermostats for entire factory, and product ovens are turned off when not in use.			X
Reduce paper usage.	Dept. A Reduce paper usage 10%	Achieved 28% average monthly reduction.			X
	Dept. B Reduce paper usage by 10% per month	Not achieved. 3% average monthly reduction. 11% reduction achieved in June.			X

	Dept. C Reduce paper usage by 10%	Achieved 45% average monthly reduction.			X
Reduce the amount of packaging disposed to landfill.	Reduce by 5%	Achieved 48% reduction. Plan implemented in June.			X
Reduce product sample disposal.	Dept. A Reduce by 10% by	Achieved 41% reduction.			X
	Dept. B Reduce by 10% by	Achieved 15% reduction. Plan implemented in June.			X
Reduce ink sample disposal.	Reduce by 10% normalized based on lot size	Achieved 32% reduction.			X
Separate ink sample and evaluation residue disposal from paper waste.	Separate 100%	Achieved 100% separation.			X
Reduce wire scrap ratio.	Reduce by 5%	Achieved 13% reduction.			
Eliminate heavy metals in plastic.	Reduce by 30% by end of June. Reduce by 100% by end of fiscal year	Achieved 45% reduction by end of June. Not necessarily a change in environmental impact. Asking suppliers to certify % of heavy metals in plastic.			X
Reduce disposal of scrap plastic/product.	Dept. A Reduce scrap disposal quantity by 1%	Achieved 11% reduction.			X
	Reduce departmental scrap by 2%	Achieved 3% reduction.			X
	Dept. B Reduce disposal of scrap plastic by 20%	Achieved 71% average monthly reduction. Temporary storage on-site over estimates reduction in months when scrap is accumulated.			X
	Dept. C Reduce scrap disposal by 5% normalized to production	Not achieved. Surplus was stored in parking lot, discovered by department manager.			X

	Dept. D Reduce monthly scrap disposed by 2%	Achieved 24% average monthly reduction.			X

Data sources: University of North Carolina National Database Report, EMS Design Table 5: Planned Dates of Objectives and Targets; and Design Update Section 6.

Pre and Post EMS Environmental Performance

Prior to design and implementation of their EMS, Pentel did not keep records of past environmental performance, including regulatory compliance. Therefore, no prior baseline exists to compare current performance of the EMS in Table 3. Reductions measured for each target in Table 2 are compared against a variety of baseline time periods, depending on availability of data and the judgement of department managers.

Pentel reported the following reductions during calendar year 2001:

- methanol use -- 104 to 30 gallons per month (eliminated free methanol)
- plastic scrap -- 2.8 to 1.9 million pieces per month
- oily waste water – 253 to 82 gallons per month
- absorbent -- 250 to 50 pounds per month
- metal bearing wastewater -- 600 to 159 gallons per month
- waste ink -- 41.1 to 24 gallons per month

Table 3 Environmental Performance Measurements

Indicator	Baseline Data				Update Data	
	1999		2000		2001	
	Non-Normalized	Nor-malized	Non-Normalized	Nor-malized	Non-Normalized	Nor-malized
Not applicable						

Data sources: University of North Carolina National Database Report, Baseline Table 2: Environmental Performance Indicator Values; and Update Table 4: Environmental Performance Indicator Values.

N.A.: Not applicable

Performance beyond Regulatory Requirements

Pentel has improved its regulatory compliance. In addition, Pentel has made achievements that are considered “beyond compliance” as described in the subsection on knowledge and understanding of legal requirements and the subsection on pre- and post-EMS environmental performance.

Table 4 Environmental Performance Compared to Regulatory Requirements

Regulatory Requirement			Objective and Target (if one identified for regulatory requirement)	Environmental Performance Measure		
Permitted Emission	Regulation	Permit limit		1999	2000	2001
VOC threshold exemptions for general cleaning of plastics expired as of 12/31/00	South Coast Air Quality Management District Solvent Rule	Some solvent blends allowed for specific uses	Target: 100% reduction of alcohol used	No reduc-tion	No reduction	Substituted an exempt cleaner—methyl acetate, then subsequently replaced with de-ionized water
	Stormwater Management Requirement of State Water Resources Control Board	No releases to storm sewer	Management of compressor condensate Reduction of scrap plastic in parking lot which drained to stormwater collection system	No reduc-tion No reduc-tion	Managed as hazardous waste Implemented housekeeping practices and scrap plastic reductions	Researching other options Continued housekeeping practices and scrap plastic reductions
	Department of Toxic Substance Control Waste character-ization requirement		Propane canisters and Treatment filter media	Dis-posed as munici-pal solid waste	Disposed as hazardous waste	Continued disposal as hazardous waste
	Department of Toxic Substances Control Universal Waste Rule		Fluorescent light tubes	Dis-posed as munici-pal solid waste	Collected by waste hauler for recycling	Continued collection by waste hauler for recycling

Compliance Performance

Based on compliance improvements as a result of EMS development, the EMS has provided better environmental protection. Pentel received four violations with no associated fines in April 2000 as the result of inviting regulators to inspect the factory for purposes of learning more about their legal requirements. Pentel resolved the deficiencies in the time frames allowed. No violations have occurred since. Two

potential violations were discovered internally during the May to December 2000 timeframe in routine procedures that are the result of the EMS.

Compliance improvement cannot be evaluated sufficiently based on regulatory notices of violation over time, since the Pentel factory is not a heavily regulated facility, is not frequently inspected, and has minimal reporting requirements. However, non-compliances and potential non-compliances discovered and resolved though Pentel's EMS internal compliance audit process provide some evidence that improved environmental and public health and safety protection is in place.

Table 5 Compliance Information

Infraction	Baseline Period		Update	
	October 1997-October 1999	November 1999-April 2000	May-December 2000	January-June 2001
Major Violation	NR	0	0	0
Minor Violation	NR	4	0	0
Non-Compliance	NR	0	0	0
Potential Non-Compliance	NR	0	2	0

Note: Most EPA enforcement policies explicitly utilize "Major/ significant (moderate) and minor" classifications to determine the appropriate enforcement response to a given violation. A non-compliance is an infraction either discovered by the regulated party or environmental agency that does not lead to violation. A potential non-compliance is a situation that is discovered and corrected before a violation could occur.

N.R.: No records at Pentel or regulatory agencies.
Data Sources: University of North Carolina National Database Report, Baseline Report 3: Violation Report; Baseline Report 4: Non-compliance/Potential Non-Compliance Report; and Update Report 5: Violation Report; and Update Report 6: Non-compliance/Potential Non-Compliance Report.

Objective 2 Environmental Information

Public and Stakeholder Involvement in the EMS Development, Implementation and Review

The Pentel EMS is certified to the ISO 14001 voluntary international EMS Standard. There is a suggestion in the ISO 14004 EMS guidance document to include consideration of stakeholder concern when evaluating significance of environmental aspects and impacts of the organization's activities, products, and services, but no requirement. The ISO 14001 EMS Standard requires that "the organization shall establish and maintain procedures for receiving, documenting, and responding to relevant communication from external interested parties." In addition, "The organization

shall consider processes for external communication of its significant environmental aspects and record its decision." There is no requirement for involving interested parties in EMS development, implementation, and review, and there is no requirement for providing better public health and environmental information than that required by the regulatory system.

When Pentel initiated development of its EMS, the Management Representative invited regulators to inspect their factory to gain a greater understanding of Pentel's environmental regulatory obligations. Contacts made during this effort led Pentel to explore participation in the Cal/EPA EMS Pilot Project and the Cal/EPA Southern California Stakeholder Working Group.

Cal/EPA established stakeholder Working Groups in both Southern and Northern California to enlist stakeholder involvement and advice in meeting the objectives of the Cal/EPA EMS Pilot Project as well as to provide a forum for stakeholder input into each pilot's EMS. Participation in a Cal/EPA Working Group was a requirement for selection as a pilot project. Pentel participated in the Southern California Working Group and hosted an on-site meeting and facility tour on May 17, 2001. Pentel's participation on the Working Group, including the EMS training sessions, was considered by their Management Representative to be a valuable venue for collegial information sharing among peers regarding EMSs. In addition, based on verbal and written comments from those attending the hosted meeting, it provided an in-depth understanding of Pentel's EMS and of their public health and safety and environmental responsibilities. Improvements were not made in Pentel's EMS due specifically to stakeholder input from the Cal/EPA Southern California EMS Working Group.

Public and stakeholder input was limited to environmental regulatory agencies input into the listing of regulatory compliance obligations during EMS development. Pentel's philosophy is to be open to regulatory inspection and make the most of the learning opportunities this affords. While they received minor violations and therefore did not receive penalties, management believed it was worth the risk to make long term improvements in their manufacturing and business operations. EMS implementation and review is primarily an internal process at Pentel.

Active and transparent participation in the Cal/EPA EMS Project was an unprecedented partnership with government for Pentel. Concerns about competition-sensitive manufacturing information were managed by requiring non-government employees participating on the Working Group to sign confidentiality statements as a requirement to participate in the factory tour.

Improvements in Public Accessibility and Quality of Environmental Information

As a result of the ISO 14001 requirement to make its environmental policy publicly available, Pentel has instituted a new procedure for making it available upon request (indicated in Table 6). In addition, communications policies and procedures were implemented for external communications with the public and for internal

communications with employees regarding job hazards. No other information is provided to the public. Pentel is not inclined to voluntarily share any information with the public, beyond its involvement in the Cal/EPA Southern California EMS Working Group, described above.

During the initial visit by regulators described above, Pentel learned that its Hazardous Materials Business Management Plan needed to be updated, and it was required to submit a Source Reduction Evaluation Review and Plan in accordance with SB 14 (Stats. 1989, Ch. 1218). Both are reporting requirements that provide information to regulators, but can be useful to other interested parties, should they have concerns about Pentel's potential environmental impacts.

Because Pentel is not considered by regulatory agencies to be a significant risk, the lack of better information is of no consequence. Because Pentel is located in an industrialized area of Torrance and neighbors the Mobile Oil refinery, community concerns and the desire for more information currently do not exist. Except for its involvement in the Cal/EPA EMS Pilot Project, Pentel is not the subject of interest to environmental advocacy groups.

Table 6 Environmental Information Type and Availability to Public

Information Subject	Legal Reporting Requirement		Location of Public Information					
	Yes	No	Web site	Public Relations Dept.	News-letter	Annual Report	Environmental Agency	Upon request
EMS Policy		X						X
EMS Env. Aspects		X						
EMS Env. Impacts		X						
EMS Objectives and Targets		X						
Operation and Procedures		X						
Compliance information	X						X	
Hazardous waste generation	X						X	
Air emissions		X						
Water discharge	pH moni-toring							
Resource use: energy		X						
Resource use: water		X						
Resource use: materials		X						
Solid Waste		X						
TRI		NA					NA	
Prop. 65	posted in factory						X	

N.A.: Not applicable.
Data Sources: California Supplemental Protocols

Objective 3 Economic Incentives and Barriers to EMS Implementation

As the EMS is a valued management tool at Pentel, the system itself is not evaluated in terms of financial costs and benefits. An analysis of economic costs and benefits of EMS implementation is not included in this case study, because economic indicators were not available from the pilot project. While Pentel does not track the full costs and benefits of its EMS, the facility contact estimates that cost savings thus far have covered the expense of retaining the consultant and auditor as well as creating the new system and its processes.

Objective 4 Identify other Challenges to Successful EMS Implementation

The following factors were important in Pentel's eventual success with EMS implementation and performance achievements.

- Executive management support was "unwavering and highly visible," as described by the Management Representative.
- The Environmental Policy is easily understood, and it is emphasized at the factory.
- The quality management experience and tenacity of the Management Representative during initial EMS development kept the effort moving forward in an efficient manner.
- Pentel was able to increase its understanding of its legal obligations and improve its compliance. They accomplished this by establishing open relationships with local environmental regulators and maintaining communication with the Cal/EPA pilot manager as a point of contact to find information within the Agency (as a benefit of pilot participation).
- Third party certification with subsequent periodic surveillance audits continues to help drive deadlines for improvements and provide another check on system reliability and integrity.

Despite the strong foundation laid for success, the following challenges were encountered.

- Involving all Department managers in identifying environmental aspects and impacts as well as evaluating their significance was a time consuming process that was initially resisted by many managers. However, the process eventually resulted in the greater understanding, acceptance, and support of the EMS by the managers.

- It is a continuing balancing act to select metrics that adequately measure and communicate environmental impact reduction without creating onerous monitoring and reporting requirements in addition to business-related metrics already in use. Pentel's objectives and metrics continue to evolve with ongoing EMS improvement efforts.

- The Torrance Factory EMS does not integrate environmental objectives into product design and marketing, as these decisions are made by the parent company in Japan.

Particular successes experienced at Pentel are described by the primary facility contact as "culture shifts", such as:

- Increased concern about environmental impacts by everyone at the factory as exemplified by the reduction in plastic debris in the parking lot and management of empty propane bottles and aerosol cans

- Personal involvement of the Vice President of Manufacturing as exemplified by a surprise internal audit he conducted
- An ongoing open relationship with regulatory agencies

Each department is making progress on reported, updated objectives. While there are many targets to manage, the system is in place to do it effectively. Small improvements at the Department level are having an important cumulative effect at the factory level and over time.

Objective 5 Role of Existing Quality Management System in the Continual Improvement of an EMS

Implementation of the ISO 14001 EMS was more readily accepted by managers and employees and made smoother by experience gained from the recently implemented ISO 9001 quality system. However, performance auditing, tracking, reporting, and management review of environmental target areas are well supported by the product quality system and the company culture.

5.0 Findings

Objective 1 Environmental Protection

In the case of the Pentel factory in Torrance, the improvements provide additional protection beyond those provided by the current regulatory system. Through its EMS, the factory improved its ability to proactively manage and reduce its negative environmental impacts.

Awareness and Commitment

- The top management commitment and assignment of environmental responsibility to every employee, as articulated in the Environmental Policy, would be expected to have some improvement on standard of care practiced by the organization

- A formal procedure to identify and periodically update applicable environmental legal requirements did not exist prior to the EMS. Pentel representatives became aware of and corrected several regulatory compliance issues as a result of creating and maintaining their list of regulatory requirements

- The exercise of identifying significant environmental aspects and impacts helped identify opportunities for proactive management that reliance on regulatory inspections would not be expected to uncover or necessarily communicate to top management

Systematic Management for Environmental Protection

- A factory-wide management approach to reducing both regulated and unregulated environmental impacts was put in place as a result of the EMS

- Pentel department managers evaluated process and material flows throughout the factory. Most of the impacts deemed significant are unregulated impacts. The most frequently identified impact is in the non-regulated area of solid waste generation, then energy use and air quality. The most frequently identified regulated impact is hazardous materials use and waste

- All targets set are for impact reductions beyond those required by law and range from reductions of 1% to complete elimination

- The system elements put in place as part of the EMS, which include operational controls, emergency preparedness, compliance assurance system, training and competency, employee involvement and communication, and supply chain management can be expected to improve protection of public health and safety and the environment as a complement to regulatory requirements. This is due to the requirement of the ISO 14001 EMS Standard to demonstrate effectiveness

- Prior to the EMS, no detailed emergency preparedness plans and procedures were in place. Employees now are aware of specific actions they are to take for various possible emergencies or accidents

- All 200 employees have received unprecedented training concerning job-related environmental issues. Factory personnel became increasingly aware of and concerned about the environmental impacts of their work

- The extra oversight provided by increased employee awareness and the internal compliance audits and management review of corrective and preventive action reports provide a greater degree of protection for public health and the environment than on past reliance on external regulatory inspections to identify problems.

Environmental Performance

Environmental performance improvements in the following areas are the result of following the systematic approach of the plan, do, check, adjust cycle of continual improvement.

- Targets, for the most part, are being met and exceeded
- Emissions of volatile organic compounds have been eliminated in one application and reduced in another
- Electricity use has declined in some areas
- Reductions were achieved in paper use, plastic scrap, and wire scrap that in most cases far exceeded targets
- Storm water run-off is dramatically cleaner
- The quantity of hazardous wastewater produced has been reduced
- Regulatory compliance has improved

Objective 2 Environmental Information

- Limited improvement in public health and environmental information to the public was observed. Regulatory compliance with planning and reporting requirements was improved. The Environmental Policy is the only piece of new information, not required by regulation, available to the public as a result of Pentel's EMS

- EMS implementation at Pentel resulted in improved communication with regulatory agencies and better regulatory compliance

- Pentel's participation in the Cal/EPA EMS Working Group was considered by their Management Representative to be a valuable venue for collegial information sharing among peers regarding EMSs

- Pentel's EMS was not modified as a result of stakeholder involvement through the Cal/EPA EMS Working Group

Objective 3 Economic Incentives and Barriers to EMS Implementation

While Pentel does not track the full costs and benefits of its EMS, the facility contact estimates that cost savings thus far have covered the expense of retaining the consultant and auditor as well as creating the new system and its processes.

Objective 4 Successes and Challenges with EMS Implementation

Pentel representatives site the following factors as important in Pentel's eventual success with EMS implementation and performance achievements.

- Strong executive management support

- An easily understood and emphasized Environmental Policy

- The quality management experience of the Management Representative

- Establishing open relationships with local environmental regulators and Cal/EPA Pilot Project Manager

- Third party certification with subsequent periodic surveillance audits continues to help drive continual improvement

Challenges include the following.

- Involving all Department managers in identifying environmental aspects and impacts and evaluating significance was a time consuming process, but resulted in greater understanding, acceptance, and support of the EMS

- Pentel's objectives and metrics continue to evolve with ongoing EMS improvement efforts

- The Torrance Factory EMS does not integrate environmental objectives into product design and marketing, as these decisions are made by the parent company in Japan

Objective 5 Record observations of whether and how Pentel's existing quality management system supports their EMS implementation efforts

Performance auditing, tracking, reporting, and management review of environmental target areas are well supported by the product quality system and the company culture.

6.0 Conclusions of the Pentel of America Ltd. Torrance Factory EMS Pilot Project

The continual improvement nature of EMSs distinguishes this approach from compliance maintenance, and therefore, if pursued with good faith effort, would be expected to increase public health and environmental protection and public information. In the case of the Pentel factory in Torrance, additional protection and limited improved information was reported by the facility pilot project contact and observed by the Cal/EPA pilot manager.

The extra oversight provided by increased employee awareness and the internal compliance audits and management review of corrective and preventive action reports provides a greater degree of protection for public health and the environment than on past reliance on external regulatory inspections to identify problems.

Each department is making progress on reported, updated objectives. While there are many objectives to manage, the system is in place to do so effectively. Pentel's

experience of setting targets and tracking performance at the department level is manageable and facilitates accountability and ownership throughout the facility.
Small improvements at the Department level are having an important cumulative effect at the factory level and over time.

Information provided to the public has improved through compliance with regulatory planning and reporting requirements and provision of the Environmental Policy to the public upon request. However, there is not a compelling reason or particularly interested public to encourage communication of more information, due to the factory location in an industrialized area and its proximity to an oil refinery. Were a change in sharing information to be warranted, the fact that information is now highly organized would help make communication more meaningful.

The EMS has facilitated Pentel's achievement of good environmental performance by intention, design, and follow-through. Even a medium-sized facility, operating in a highly competitive market, with limited environmental legal obligations benefited from the rigorous systematic approach of an EMS. Without a systematic approach to meeting environmental obligations, many small to medium-sized facilities may be meeting their environmental obligations by accident, rather than by design.

The role of government in providing compliance information and EMS education, facilitating community/stakeholder input and peer networks, and evaluating environmental management system effectiveness was expressed by the facility representative as a more effective approach for improving environmental protection than the model of inspections, infractions, and penalties.